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ABSTRACT

This summary report outlines the aims of a project that focused on provision of short courses for technical professionals in the chemical and allied process industry and the process plant industry. Continuing education needs of both companies and individuals, as well as corporate policies and attitudes toward continuing education and constraints on its use, were identified through questionnaires sent to relevant company offices. The report's main text demonstrates that continuing professional development (CPD) requires that much effort be put into sampling companies, programs, and participants. The ensuing data reveal the usual problems associated with coordination, marketing, release of staff, and meeting of a wide range of needs. Although external short courses remain the staple diet of CPD, the report indicates they are perceived by companies as being insufficiently practical and too remote from the real issue. These company needs are indicated: relevance, credibility, and coordination. Individual participants are reported as needing accreditation. A section is devoted to the distinctions between "bottom-up" and "top-down" curriculum development, both of which are seen as necessary, but, as elsewhere, this mix raises issues of coordination. The report generally concludes that many unsatisfied needs remain. It maintains that more "bottom-up" courses are required and this requires a more systematic approach and more coordination. Recommendations focus on the need for a CPD coordinating mechanism. Appendixes include definitions and abbreviations and the questionnaire. (YLB)

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A LARGELY UNSATISFIED NEED: CONTINUING PROFESSIONAL DEVELOPMENT FOR PROCESS AND PROCESS PLANT INDUSTRIES

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PROJECT REPORT

A LARGELY UNSATISFIED NEED: CONTINUING PROFESSIONAL DEVELOPMENT FOR PROCESS AND PROCESS PLANT INDUSTRIES

A SUMMARY

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Further Education Unit

Professional, Industrial and Commercial Updating

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Secretaries of Regional and FE
Examining Bodies,
Press and other Interested
Institutions/Individuals.

Dear Sir/Madam,

A LARGELY UNSATISFIED NEED:
CONTINUING PROFESSIONAL DEVELOPMENT FOR PROCESS AND PROCESS PLANT INDUSTRIES

I attach a summary report of the above title. It is one of a series of FEU/PICKUP reports relating to the increasing interest in continuing professional development (CPD).

In this case the area under investigation was the process and process plant industry. The researcher was Arnold Brown under the direction of the late Professor Hanson and Dr. Geldart of Bradford University. The Introduction indicates that the project was a response by FEU to an initiative from Bradford University and the Institution of Chemical Engineers.

This summary report, prepared by the FEU outlines the aims of the project, the methodology and background, the conclusions and recommendations.

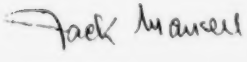
The main text demonstrates once again that CPD requires much effort to be put into sampling companies, programmes and participants. The ensuing data reveals the usual problems associated with co-ordination, marketing, release of staff and meeting a wide range of needs. And although external short courses remain the staple diet of CPD, the report indicates that they are perceived by companies as being insufficiently practical and too remote from the real issues. Relevance, credibility and co-ordination appear to be the company needs; individual participants would add the need of some form of accreditation.

The authors devote a section of their report to the distinctions between 'bottom-up' and 'top-down' curriculum development, both of which are seen as necessary; but, as elsewhere, this mix raises issues of co-ordination.

The report generally concludes that there remain many unsatisfied needs in this sector of industry for continuing professional development. The authors maintain that, to meet these needs, more 'bottom-up' courses are required; and all this requires a more systematic approach and more co-ordination. Their recommendations thus focus on the need for a CPD co-ordinating mechanism.

Not all readers will agree with the specifics of the authors' recommendations, but few will disagree with the need for a more cohesive approach to CPD. This report confirms the existence of a general set of problems that beset the FHE system with respect to identifying needs, co-ordinating and delivering, costing and pricing, and evaluation. These are mainly related to curriculum development and this document is intended to help, at least in one sector.

Yours faithfully,



JACK MANSELL
Chief Officer

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I. INTRODUCTION

1. In recent years the continuing education of technical professionals in its wider sense has been recognised to be an important element in maintaining the international viability of British manufacturing industry. The focus of the present project is the provision of short courses for technical professionals in the chemical and allied process industry, and the process plant industry. The initiative for the project came jointly from the Schools of Chemical Engineering of Bradford University and the Institution of Chemical Engineers (I.Chem.E.). The Institution has more than 15 years experience of organising a comprehensive annual programme of short courses for Technical professionals working in the industries which are the subject of this study ('subject industries'), and Bradford University has been closely associated with this work throughout the period.

2. The project was located at Bradford University under the joint directorship of (the late) Professor Carl Hanson and Dr. Derek Geldart. Arnold Brown of Harrogate Consultants was appointed to carry out the research, the results of which are summarised in the present report.

II. AIMS OF THE PROJECT

3. (i) To evaluate the future needs for continuing education in the development and updating of graduate and professional engineers in the processing and process plant industries in the UK.

   (ii) To investigate the feasibility of assessing the performance of participants on short continuing education courses and of instituting credit accumulation and transfer arrangements.

   (iii) To develop courses and curricula in a form which will meet the needs identified in (i) and (ii) above.

III. METHODOLOGY

Company selection

4. Companies within the scope of the project were defined as all manufacturing chemical converters, mainstream process plant manufacturers and also selected food manufacturers, paper makers and petroleum refiners. The Trade Directory 'Kompass' was the main source of information used and 1444 companies were initially approached.

Approach to companies - Stage 1 (Initial Questionnaire)

5. The initial approach was made to technical directors of the selected companies with the objective of obtaining the maximum response from the intended respondents. It consisted of a short initial questionnaire on a postcard, a reply-paid envelope and a short covering letter. The response rate was 18%.

6. 70% of respondents (184) indicated that they would be prepared to accept a visit, complete a detailed questionnaire or help in either of these ways. Detailed questionnaires were sent to all the companies willing to complete one (138).

Approach to companies - Stage 2 (Detailed Questionnaire)

7. The Detailed Questionnaire (Appendix 2), with an accompanying letter, was addressed to the individual who returned the initial questionnaire. In the great majority of instances this was the technical director or another member of the company's board. The response rate was 55% giving 76 replies. The analysis of replies is included in the full report.

Approach to companies - Stage 3 (Visits to companies)

8. Companies to be visited were selected from amongst those that offered to help in this way only. The visit programme was arranged to include companies having differing types of activity, scales of operation and geographical locations.

Contacts with educational establishments

9. The researcher made visits to the Chemical Engineering Departments of the following:

Loughborough University of Technology
Teesside Polytechnic
Imperial College of Science and Technology (London University)
University of Bradford

In each instance the views of one or more members of staff, concerning the subject matter of the Project, were obtained in confidence. Use is made in the body of the report of the information received.

Attendance at sponsored short courses of the I.Chem.E.

10. The researcher attended the following courses:

— 'Basic Solvent Extraction Technology' — University of Bradford

— 'Computer Control of Processes' — Teesside Polytechnic

Pre- and post-course questionnaires were developed for the Solvent Extraction Course and will replace those previously used for I.Chem.E. sponsored courses. The new questionnaires are simple to complete whilst facilitating quantitative assessment of participants' responses.

Consultation with professional bodies

11. Copies of the Project Information Bulletin and an explanatory letter were sent to a number of professional and other bodies.

IV. THE CORPORATE PURPOSE OF THE PROVIDERS OF CONTINUING PROFESSIONAL DEVELOPMENT (CPD)

12. Public sector educational establishments were found to have in common several motivations and constraints in providing short courses for technical professionals. The primary motivation is financial in terms of fees to directors and speakers, and of funds which can be used flexibly within the providing department to support discretionary spending, such as finance for a new research fellow.

13. Constraints include :

- Course direction means a great deal of additional work for these individuals.
- Directors of 'one-off' courses usually have all the administration to do themselves.
- Course directors are often frustrated and handicapped by inadequate or inefficient catering and/or general administrative services in their establishments.
- Courses always have to compete with other short-term pressures for the attention of directors and their faculties.

14. In some instances, e.g. courses organised by the Institution of Chemical Engineers, Institution of Mechanical Engineers and the Royal Society of Chemistry, the educational establishments act as secondary providers, and the relevant corporate purpose is that of the Institution. Here, the corporate purpose is undoubtedly strong.

15. The Institutions need not be entirely dependent on the educational establishments for the provision of short courses, but in practice most members of education committees and course directors are from universities or polytechnics.

V. BACKGROUND ANALYSIS

Short courses - general

16. The external short course is a phenomenon arising out of post-war mobility which became established in North America and Europe during the 1960s and experienced a period of rapid growth and development during the 1970s. The I.Chem.E. instituted an organised programme of short courses in 1970; attendance at these courses built up to around 500 per annum during the 1970s, but no further increase has occurred during the 1980s.

17. There are indications that the other Engineering Institutions which provide programmes of external short courses operate at a similar, but rather lower, level. Their aggregate turnover for couses relevant to the subject industries is estimated to be of the order of £0.3m.

Origin of UK participants

18. The origin of participants has been analysed using information provided by the Institution of Chemical Engineers. 62% of participants are from the UK of which 17% are *not* from the very large international companies. Inspection of the attendance lists for the 17% indicates that the great majority of these participants are from medium-sized companies, i.e. companies employing 21-100 technical professionals. This supports the Institution's impression that the courses do not attract participants from small companies (up to 20 technical professionals).

Overseas participants in I.Chem.E. sponsored courses

19. 38% of the sample analysed consists of overseas participants of which 47% are from Scandinavia, 30.5% from Benelux and 22.5% from the major EEC countries (Germany, France and Italy). The Institution has 535 European members (of which 169 are in Holland), and 720 in the USA and Canada, most of which are likely to have sight of information concerning the short courses, but there is no systematic overseas promotion. In view of this, the overseas participation is very high and could undoubtedly be considerably increased by active marketing.

Providers of short courses

20. CPD products directly competitive with the short courses offered by the Institutions include :

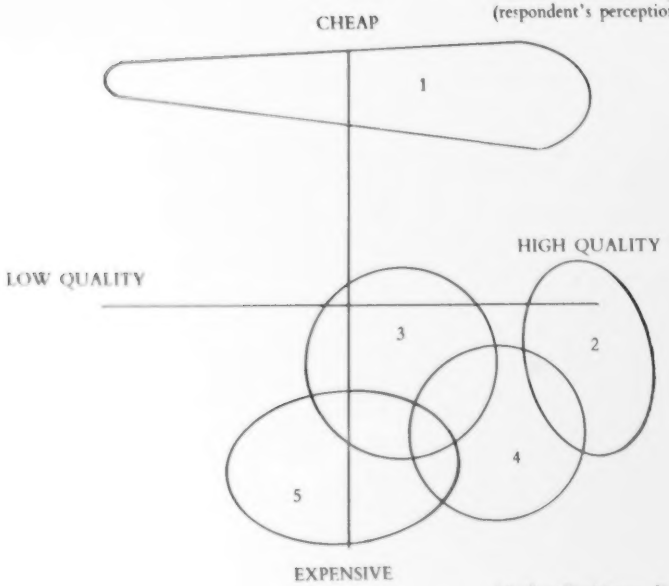
    — conferences and symposia
    — 'in-house' short courses
    — short couses offered by educational establishments (acting as primary providers)
    — those offered by commercial private sector providers.

    The market positioning of these five products is shown in figures 1 and 2. It will be seen that the market position of short courses organised by Institutions is perceived to be in the 'high quality fairly expensive', 'high credential moderately cost-effective' segments of the market, and it is clear from the detailed questionnaire and from visit interviews that the cost-effectiveness should be improved by increasing the relevance of the subject matter to commercial companies rather than by reducing the price.

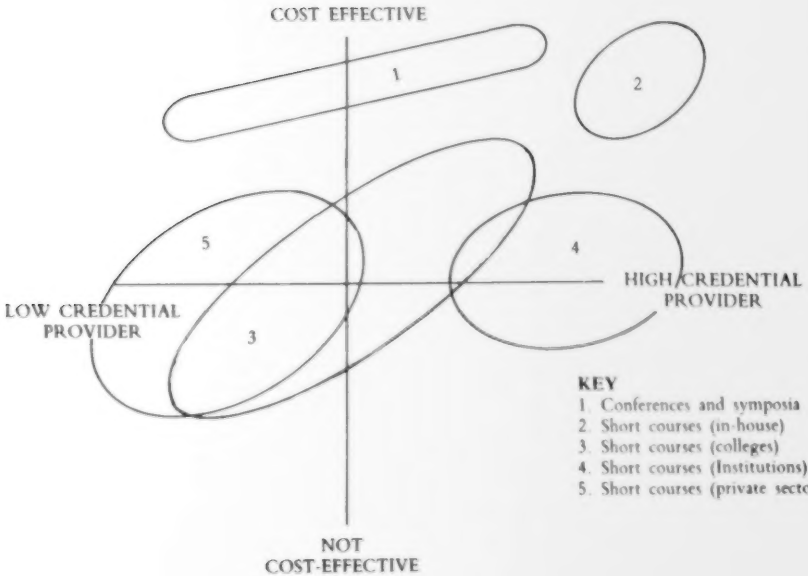
Current trends

21. Respondents to the Detailed Questionnaire (Appendix 2) show a strong preference for in-house courses. Although it is the large companies who apparently favour this formula, it is believed that the preference is based on the confidence that a tailored in-house course will have a high relevance to company objectives and will also be cost-effective because indirect costs are minimised. These considerations will also appeal to small companies but the practical difficulties are greater. It is the project team's view that the current trend is strongly towards courses with a high practical content tailored to customers' needs and preferably in-house. Small companies may look to their Local Collaborative Programmes (MSC and PICKUP) to provide short courses to cater for the common needs of their technical professionals.

Market Positions Fig 1
(respondent's perceptions)



Market Positions Fig 2
(respondent's perceptions)



22. A problem with courses arranged by academic institutions tends to be that they are dependent on the personal enthusiasm of energetic senior members of staff who set up good quality courses largely based on their special areas of interest. These products satisfy a segment of the market well, although they tend to be rather too lengthy and theoretical, with too little direct relevance to commercial activity. They are 'top-down' in the sense that they are products looking for customers rather than products developed to meet the needs of the whole market. By contrast, the primary need for commercial private sector providers to maximise turnover leads to a 'bottom-up' approach to syllabus and curriculum development, and this in turn results in a much higher proportion of courses with non-academic course directors and more practical content.

23. The 'top-down' type of provision system has other effects. For example, it is much easier for academic course directors to organise courses during the vacations, but this is not always the most convenient time for potential participants to attend.

Accumulation of 'credits' for short courses

24. Existing short courses in Europe make no provision for assessment, and there is no system by which participants are awarded 'credits' in recognition of their satisfactory performance at an external CE activity. It has been suggested that the institution of credit accumulation and transfer arrangements might influence the motivation of course participants and this suggestion was explored.

25. A possible model for a credit system is already available in the USA where Continuing Education (credit) Units (CEUs) are awarded for attendance at qualifying short courses, and this system was discussed by the researcher with the CPA and others in the USA. University courses for engineers in the USA include a built-in flexibility that enables undergraduates considerable discretion in choosing the composition of their syllabus, provided that they accumulate the required total of 'credits' for the courses taken. Consequently, the 'credit' system is endemic in professional education and the availability of some kind of certification of attendance is expected by the participant in a CPD activity. There is no provision for assessment and consequently the CEU is simply based on attendance rather than performance.

VI. NEEDS ANALYSIS

Companies and individuals

26. Companies within the scope of the Project were defined as all manufacturing chemical converters, mainstream process plant manufacturers and also selected food manufacturers. The total number of companies contacted was 1444 and it is estimated that the total number of technical professionals employed by them is probably of the order of 40,000, of which approximately 20,000 are engineers and of these, 9,000 are chemical engineers.

The customer for short courses

27. In order to analyse the needs of the market for short courses it is necessary firstly to identify the direct customer. This is the employing company and not the employed technical professional. The company pays both in cash and by forfeiting the time of the employee. Indications from respondents to the detailed questionnaire (see Appendix 2) and visit interviews were that employee release is considered by companies to be a greater constraint than the direct and indirect costs of courses. Companies need to be satisfied that short courses are cost-effective before they are prepared to be buyers.

Market segmentation

28. It was found that all the companies visited were primarily concerned with the degree of relevance that available forms of CE have to their own business. Short courses were recognised to be an important constituent of the mix for technical professionals but perceived to represent a small corner of the complete education and training scene. In the context of training and education, the primary responsibility of managers in small companies is perceived to be the needs of their work force, up to and including supervisor level, rather than for themselves and their colleagues. In the large companies more corporate attention is paid to the systematic continuing education of technical graduates. However, in all the companies visited a wide perception of continuing education for professional people was evident.

29. Expectations from short courses were generally low. Several companies with specialised requirements said that they did not expect courses to be available to meet their specific needs, and the general view was that courses have too little practical content, are too remote from the market place and include unnecessary material. None of the small companies visited were significant consumers of short courses.

30. Primary determinants of the probability that a given company will be a customer for short courses were judged to be the following.

Company size

31. Graduates in small companies were hard-pressed managers or directors who felt that the benefit likely to be available from an external course would not justify their absence from the company. This attitude was virtually absent in the large companies.

Commercial confidence

32. Companies with 'high commercial confidence', those with expanding business and satisfactory profitability, are likely to be the best customers.

Corporate attitude

33. 'Progressive' companies, exemplified by evidence of an open-minded, confident, corporate search for new ideas and opportunities, were likely to be good customers provided that courses relevant to their activities could be found.

Technology and technical capability

34. Although there is a high probability that companies in high technology areas will be good potential customers for short courses, they may not be actual customers because of their needs for more specialised products which the current system finds difficult to provide. Companies with a low technical capability may be expected to be poor customers, and companies with a high technical capability will generally be good customers except for those who have experienced a shift of technology away from their operations.

Current market size

35. An accurate estimate of the market size for short courses would have to be based on categorisation of companies within the subject industries and is beyond the scope of the present Project. However, a rough 'bottom-up' guesstimate of the order of magnitude gives a total of 2000 current participants.

36. Perhaps the most significant estimate is that the participation of technical professionals from UK companies in in-house short courses may be a factor of 8 greater than participation in external short courses (16,000 versus 2,000).

Needs of the market for short courses

Relevance

37. The overriding need of companies for courses of high relevance to their corporate objectives has already been discussed.

Credibility and co-ordination of providing agencies

38. An important missing element in the marketing mix is a quick and convenient means of identifying courses of a uniformly good quality by topic without obtrusive disciplinary or providing agency distinction.

39. A company's prime requirement is for technical courses that benefit the company rather than courses that address the personal needs of individuals.

40. There is a need in small companies for personnel such as production and factory managers to discuss day-to-day management and operating problems with experts outside their company. An excellent solution to this problem is provided by the Collaborative Studies Unit of Salford University where managers from a number of companies meet for half a day once a week to discuss problems together and obtain expert guidance from the faculty of that university.

Company involvement in curriculum development

41. The strong view of companies is that they would like to have more involvement in setting course objectives. It is clearly in the interests of both the providing agencies and companies that effective channels of communication should be developed between them. Large companies are generally well represented within professional institutions, but communications with small companies are tenuous.

Accumulation of 'credits' for short courses

42. Almost 30% of respondent companies said that they would be willing to be involved in a transferable credit accumulation system. It became clear, however, that companies are less concerned with the possible benefits of a 'credits' system for individuals than in finding a way of checking the cost-effectiveness of a given course.

VII. STRATEGIES

43. The total number of technical professionals of all disciplines comprising the market was estimated to be about 40,000. It was calculated that even for technical professionals employed by companies within the present market the probability of an individual taking a three-day external course during his/her working life may be about 0.5. This is inconsistent with the view expressed by respondent companies that up to 1 - 2 working weeks p.a. would be an acceptable level of attendance for each professional and suggests that the potential demand for external short courses greatly exceeds current sales.

Sales targets

Market size forecasts

44. Recent reports of the Chemicals Industry's and Process Plant Industry's EDCs* suggest that total employment in these industries will continue to decline. However, it seems likely that competitive pressures and continuing technological progress will result in the employment of a higher proportion of technical professionals in the surviving companies. On balance, it is the project team's view that the number of UK technical professionals comprising the market for short courses in the UK is likely to remain roughly constant for the foreseeable future, i.e. an accessible market of about 40,000 technical professionals employed in the subject industries.

The short term

45. The extended planning and marketing cycle for short courses means that implementation of the recommendations of the present report could not have a significant effect before 1987, but the project team believes that a 50% increase in sales should be achievable in 1987.

* *Chemicals Industry Report to the National Economic Development Council* Chemicals EDC, June 1983.
Process Plant Industry Report to the National Economic Development Council Process Plant EDC, April 1983.

The medium term

46. By 1990 improved curriculum development, a widened syllabus and improved marketing could have a very significant effect on sales at home and abroad, enabling providers to sell a multiple of several times 1984 sales, say five times. It is possible that a considerable proportion of these sales would be 'in-house' rather than external.

The long term

47. Providers should be able to double their sales between 1990 and 2000. This would mean that, by the end of the century, technical professionals in the subject industries could expect to take one three-day short course every six years on average.

Improvement programme

48. Strategies to move from current towards target sales must depend on either enlarging the present market or improving sales to existing customers. The following strategies are recommended :

    i) A better system of syllabus development is needed especially with regard to the needs of specialised and small companies.

    ii) There should be a greater involvement of specialists from industry and consultancy as course directors and speakers. The 'workshop' content of courses should be increased and carefully planned to make it of direct practical relevance to the course. An effective system is needed to match course content to the needs of companies.

    iii) More effective consultative machinery is needed between course providers and their potential customers.

    iv) Common standards for short courses and greater co-ordination between complementary agencies are required.

    v) A higher standard of entrepreneurial marketing and sales administration is needed for short courses.

    vi) Courses should be positively and professionally marketed overseas, especially in Europe and the Middle East.

Accumulation of 'credits' for short courses

49. In the view of the project team there is at present no developed market demand for a 'credit' accumulation system associated with short courses. However, essential prerequisites are considered to be :

    - A corporate will on the part of the professional bodies to require corporate members to continue in a structured programme of personal development, at least during the earlier part of their careers. The place of short courses in such a programme would have to be determined by each professional body.

    - Effective co-ordination and validation of courses by the professional bodies. This would be necessary to interest the customers for short courses, i.e. companies in the subject industries.

VIII. CONTROL SYSTEMS

50. Customer confidence plays a major role in the information collecting and decision-making processes that lead to the purchase of CPD in the form of external short courses. Responses indicate that UK Institutions have a favourable image and this should be protected by an effective system of monitoring and continuously improving courses. Pre- and post-course questionnaires, designed to give quantitative measures of key quality indicators, can be used effectively in this respect. Course directors meetings should be used to draw the attention of directors to ways in which the general quality level of courses can be raised.

51. A second major concern of customers is the wish of companies to have a means of assessing meaningfully the cost-effectiveness of courses. Two indications of this are readily available:

    — the participant's subjective assessment of the proportion of the course content that was directly relevant to his/her company's business

    — evidence of practical application of acquired knowledge on the return of the participant to his/her company

52. However, there does seem to be a clear indication that many companies, especially the small ones, would welcome some form of built-in performance assessment for external short courses. This possibility should be explored further by course providers.

IX. CURRICULUM DEVELOPMENT EXERCISE

53. This section of the report describes the process required to devise, plan and make available the 'bottom-up' content of a comprehensive curriculum. Because 'top-down' courses will continue to play an important role, the stages involved in developing that part of the curriculum content are also described.

Development of a 'bottom-up' short-course curriculum for the pharmaceutical manufacturing sector of the process industry

54. The market-oriented 'bottom-up' approach to curriculum development for short courses is set out in figure 3.

Identification of customers' needs

55. Four manufacturing pharmaceutical companies (all employing more than 100 professionals) were visited and the following common requirements relevant to the provision of short courses were identified :

— Courses must be highly relevant to the pharmaceutical sector.

— The course director and his/her faculty must be recognised as authoritative in the subject matter of the course.

— The main content of a course must be practically oriented and course faculty with personal industrial experience are much preferred.

— Most courses should be concerned with activities common to all manufacturers, and of low commercial sensitivity.

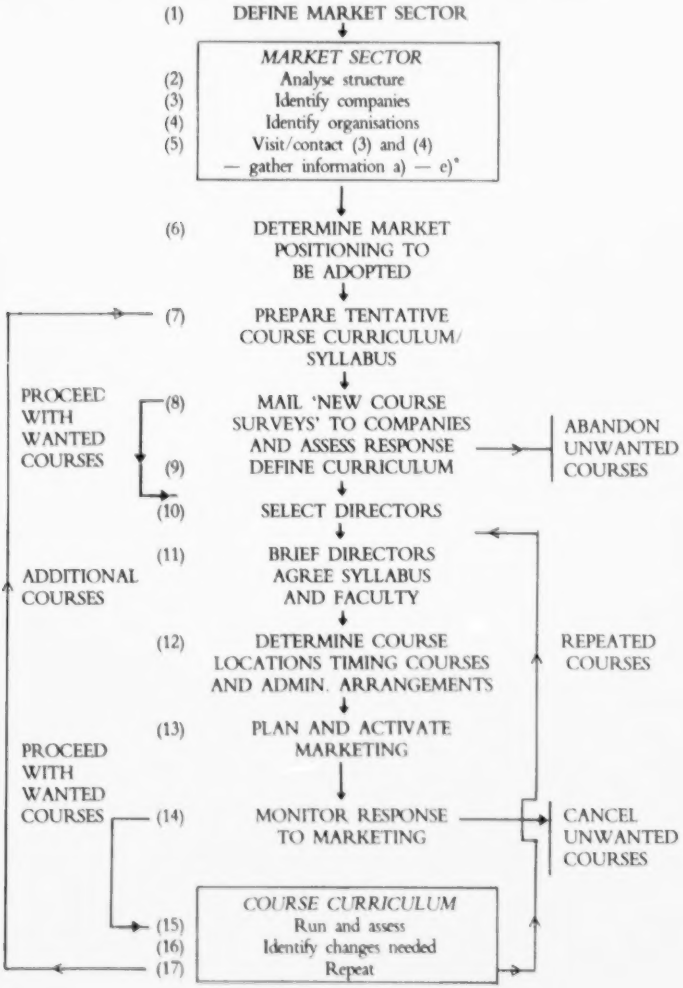
— Courses should give ample opportunity for informal discussion between participants and the widest possible participation is preferred.

— Courses of a general nature, suitable for recent recruits or for graduates moving within the company, are needed, but must be available at regular, say, six-monthly intervals.

— Courses specific to disciplines are not generally useful.

— UK based courses are much preferred, and should be reasonably priced.

Figure 3
'BOTTOM-UP' CURRICULUM DEVELOPMENT


(1) DEFINE MARKET SECTOR
MARKET SECTOR
(2) Analyse structure
(3) Identify companies
(4) Identify organisations
(5) Visit/contact (3) and (4) — gather information a) — e)*
(6) DETERMINE MARKET POSITIONING TO BE ADOPTED
(7) PREPARE TENTATIVE COURSE CURRICULUM/ SYLLABUS
PROCEED WITH WANTED COURSES
(8) MAIL 'NEW COURSE SURVEYS' TO COMPANIES AND ASSESS RESPONSE
ABANDON UNWANTED COURSES
(9) DEFINE CURRICULUM
(10) SELECT DIRECTORS
(11) BRIEF DIRECTORS AGREE SYLLABUS AND FACULTY
ADDITIONAL COURSES
(12) DETERMINE COURSE LOCATIONS TIMING COURSES AND ADMIN. ARRANGEMENTS
REPEATED COURSES
(13) PLAN AND ACTIVATE MARKETING
PROCEED WITH WANTED COURSES
(14) MONITOR RESPONSE TO MARKETING
CANCEL UNWANTED COURSES
COURSE CURRICULUM
(15) Run and assess
(16) Identify changes needed
(17) Repeat

NOTES

* Information to be gathered from market (see activity (5))
- a) Categories of technical professional employed
- b) Perception of CE needs that can be served by short courses
- c) Current provision of short courses to the industry and its adequacy
- d) Relevant course topics
- e) Suitable course directors

— Companies would accept a high degree of involvement.

56. The researcher was told by companies visited that short courses would be particularly useful in the areas of **emulsions** and **powder** technology, and of **sterile factory design**. Informal contact was made with the Pharmaceutical Society and the Association of the British Pharmaceutical Industry (ABPI), and helpful information concerning the present provision of CE in the industry was obtained.

Existing CE provision

57. The certification of 'Qualified Persons' in the industry calls for training that may be provided in part by short courses, and several polytechnics and universities run short courses intermittently. Conferences and symposia are organised by a variety of bodies and play a significant role in the continuing education of technical professionals. However, there is presently no systematic provider of short courses specifically targeted at the pharmaceutical industry, other than the Centre for Professional Advancement (CPA) which is based in the USA but offers about six courses on pharmaceutical topics that are run in Holland.

Gap between CE needs of customers and satisfaction

58. It was concluded that the present provision of CE for the pharmaceutical sector in general and of short courses in particular is well below the potential demand and is too fragmented.

59. It is clear, however, that the establishment in the UK of a comprehensive programme of short courses designed to meet the needs of the manufacturing pharmaceutical industry would not follow simply from sound curriculum development. It would be necessary first to overcome two inhibiting factors:

— The number of potential participants from UK companies alone would be too low to allow either the specialised or the frequent, general, short courses that are needed by the industry to be offered at reasonable prices - the market would have to be enlarged to include the rest of Europe.

— Each of the several groups of technical professionals employed in the industry consists of a small proportion of the profession (e.g. only about 5% of professionally qualified pharmacists are employed in

manufacturing industry); a single providing organisation operating, with the approval of, but not identified exclusively with, any one of the professional bodies would be needed to provide a balanced systematic curriculum to satisfy the needs of companies for the whole of their business.

Characteristics needed in the short-course providing organisation

60. The exercise in the pharmaceutical sector confirmed both the usefulness of good 'top-down' short courses and the need for these to be supplemented by many more good 'bottom-up' courses. It is estimated by the project team that a systematic, balanced curriculum for the pharmaceutical sector may well contain about five times as many 'bottom-up' as 'top-down' courses.

61. Companies would much prefer to have curricula organised on an industry, rather than on a professional disciplinary, basis and it is suggested that a new single providing agency is needed. Such a providing agency would most readily achieve credibility in the industry by offering courses approved by the relevant institutions and professional societies but not dominated by any one of them.

Development of a 'top-down' course

Background

62. The Schools of Powder Technology/Chemical Engineering at the University of Bradford have been active for more than 15 years in providing short CE courses. Their policy has always been to mount courses which are based only on their research interests. The Bradford courses, usually run in association with the Institution of Chemical Engineers, have been very successful and have a deservedly high reputation in the UK and continental Europe. An important element in the success of the courses has been the development of an effective mailing list addressed to individuals of which 40% are employed in continental Europe. This results in up to one third of participants in Bradford courses being drawn from outside the UK.

Selection of a topic

63. In a 'top-down' approach, the course director is self-selecting, in contrast with the 'bottom-up' approach where a suitable course director must be sought. The idea for a course on the processing of cohesive

powders had been in the mind of Dr. Harnby for some time. Firstly, his research interests had been moving in that direction, and secondly, responses from questionnaires completed by participants on Dr. Harnby's existing courses had indicated increasing industrial interest in mixing cohesive powders.

Further planning

64. An outline syllabus for the course was drawn up. This consisted at first of the titles of lectures, and it was the number of these which determined the length of the course (three days).

65. Outline approval for a sponsored course was sought from the Institution of Chemical Engineers, and this having been given, a more detailed programme with a financial budget, was drawn up. This in turn was submitted to, and received approval from, the Institution of Chemical Engineers Continuing Education Committee.

66. A leaflet was then devised and printed in the house style of I. Chem. E. by Dr. Harnby, and approximately 2,000 copies mailed. This was done about three months before the commencement of the course (which was first held in July 1985). The course attracted 24 participants, at a fee of £100 per day, and with minor modifications was offered again in July 1986. The key elements in making the whole operation successful are that the course director:

— is enthusiastic and a good organiser

— has a good reputation (as a researcher and communicator)

— has correctly judged the need

— knows competent lecturers

— has access to a sufficiently large and effective mailing list

— is allowed plenty of time to plan, print and mail the brochures

— is sensitive and responsive to participants' suggestions for improving and refining the course.

A flow-diagram summarising the procedure is attached (see figure 4).

Figure 4

'TOP-DOWN' CURRICULUM DEVELOPMENT PROCEDURE

1. POTENTIAL COURSE DIRECTOR HAS AN IDEA ARISING OUT OF PROFESSIONAL (USUALLY RESEARCH) INTERESTS
2. Discusses idea with colleagues
3. Talks to other parties in industry or in potential sponsoring body
4. Draft outline is drawn up, course length decided
5. Outline approval sought from sponsoring body
6. Detailed syllabus drawn up, tentative date chosen
7. Suitable lecturers identified and approached
8. Detailed syllabus and budget submitted to sponsoring body
9. If approval obtained, brochure planned, printed and mailed not less than three months prior to start of course
10. Course run and reaction of participants assessed
11. Course repeated with any necessary modifications and improvements

X. CONCLUSIONS

67. • Companies have a largely unsatisfied need for short courses that are highly relevant to their own operation.

• Most courses provided for the process and process plant industries are 'top-down' that is, they are largely based on the expertise of enthusiastic and energetic academics.

• Although existing short courses are well regarded, especially when arranged by Institutions, many potential customers feel that there is too little practical content and too much theory. Small and specialised companies in particular feel that their needs are not being met.

• Comparison of current sales of external short courses with the number of technical professionals employed in the process and process plant industries indicates a very low market penetration.

• Comparison of the strengths and weaknesses, opportunities and threats for external short courses arranged by Institutions suggests that an improvement programme is needed to enable them to compete effectively with in-house courses and private sector providers.

• A change is required in the way syllabuses are developed so that more short courses are based on the business needs of companies ('bottom-up' courses).

• There is, at present, no developed market demand for a credit accumulation system.

• There is a strong view from companies that they require more positive means by which they can measure the cost-effectiveness of courses.

• There is no effective national co-ordination of short courses for the CE of technical professionals in the UK.

• The manufacturing pharmaceutical sector, in particular, has an unsatisfied need for a systematic curriculum of short courses.

XI. RECOMMENDATIONS

68. • That a new short course providing organisation should be set up with the primary objective of systematically generating and marketing 'bottom-up' courses, i.e. courses based on the business needs of companies.

• That the support of representative industry associations and the DES should be sought for the first recommendation above.

• That the possibility of initially applying the first recommendation specifically to the manufacturing pharmaceutical sector be considered with the ABPI and member companies.

• That active overseas marketing and promotion should be considered by all providers of short CE courses for technical professionals employed in industry.

• That agencies providing short courses for technical professionals in industry should note the need for them effectively to involve industrial firms, including small and specialist companies, in curriculum development.

• That the providing agencies should try to meet the wish of companies to have a satisfactory means of measuring the cost-effectiveness of external short courses.

• That a national means of co-ordinating the total offer of short courses to industry should be set up.

APPENDIX 1: DEFINITIONS AND ABBREVIATIONS

1. DEFINITIONS

'Small companies' — those stating that they employ 20 or less technical professionals.

'Large companies' — those stating that they employ 21 or more technical professionals.

'Subject industries' — the process and process plant industries.

'Top-down' courses — term used for short courses which arise mainly from the special interest and enthusiasm of an individual who is usually an academic.

'Bottom-up' courses — term used for short courses that are developed specifically to meet the objectively identified needs of a sector of industry or company.

2. ABBREVIATIONS

ABPI — Association of British Pharmaceutical Industry

CE — continuing education

CPA — the Centre for Professional Advancement (New Jersey USA)

CPD — continuing professional development

I.Chem.E. — Institution of Chemical Engineers

MSC — Manpower Services Commission

PICKUP — Professional, Industrial and Commercial Updating (DES initiative)

APPENDIX 2: QUESTIONNAIRE

UNIVERSITY OF BRADFORD

SCHOOLS OF CHEMICAL ENGINEERING

BRADFORD, WEST YORKSHIRE BD7 1DP
Telephone BRADFORD (0274) 733466
Telex 51309 UNIBFD G

Dear

CONTINUING PROFESSIONAL DEVELOPMENT IN THE PROCESS AND PROCESS PLANT INDUSTRIES - PICKUP RESEARCH PROJECT

Thank you for your positive response to the exploratory questionnaire concerning the up-dating of professional engineers and scientists. I am delighted that you have agreed to provide further information by completing a more extensive questionnaire, and a copy is enclosed.

Most of the questions require only a tick in the relevant box but we are well-aware that you might have views which do not fit easily into this format and we have therefore left space for additional comments.

The questions are intended to provide information concerning the continuing education needs of both company and individual, current corporate policy and attitudes towards continuing education and the constraints which govern its use.

A report will be written based on the replies and will be published towards the end of 1985.

We look forward to receiving your reply and thank you once again for your co-operation.

Yours sincerely

D. Geldart
Project Director

A.S. Brown
Researcher

UNIVERSITY OF BRADFORD

RP 236 Department of Education and Science with Bradford University

Continuing Professional Development in the Process and Process Plant Industries

QUESTIONNAIRE

COMPANY	
ADDRESS TELEPHONE	
NAME AND RESPONSIBILITY	

1. THE ENGINEERS AND SCIENTISTS (Graduates or equivalent) IN YOUR COMPANY
Please indicate the approximate number in each category.

Chemical Engineers:	Chemists:	Others:
Other Engineers:	Physicists:	TOTAL: [all categories]

2. YOUR COMPANY'S NEEDS FOR CONTINUING PROFESSIONAL DEVELOPMENT
Please tick the value you attribute to the following aspects of continuing education for your engineers & scientists [1 high, 5 low] [whether in house or external]

		1	2	3	4	5
Corporate Need						
2.1	Appreciation of new technology and processes					
2.2	Acquisition of the knowledge to apply new technology and processes effectively					
2.3	To ensure that your Company continues to be technologically competitive					
2.4	Up-dating in areas of specialist technical knowledge					
2.5	Up-dating in managerial skills and techniques					
Career Development Needs of Individuals						
2.6	Acquisition of new skills or qualifications relevant to employment					
2.7	Preparation for new responsibilities (by promotion or broadening of the area of work)					
2.8	To up-date older engineers and scientists					
2.9	To supplement and deepen existing personal expertise					

Other Needs

2.10 Please comment below:-

3. CORPORATE ATTITUDE TOWARDS CONTINUING PROFESSIONAL DEVELOPMENT

[Please tick the appropriate box]

3.1 How many working days per annum per individual are considered appropriate for external courses?

DAYS			
<5	5-9	10-15	>15

3.2 Do you run in-house courses (as distinct from on-going training) for your engineers and scientists?

YES	NO

If so:-

(a) what is the average duration of each course?

DAYS			
1-2	3-5	6-10	>10

(b) is individual performance on courses assessed?

YES	NO

3.3 How do you rate the value obtainable from the following [1 high, 5 low]:-

	1	2	3	4	5
(a) Symposia and Conferences					
(b) Supplier's technical representatives					
(c) In-house short courses (if applicable)					
(d) External short courses organised by Professional Institutions					
(e) External short courses organised by commercial agencies					
(f) Correspondence courses, Open University etc.					

(g) Do you find any activities other than the above of value in professional development for individuals?

YES	NO

If so, please give details below:-

3.4 (a) Would you like the performance of individuals on external courses to be assessed?

YES	NO

(b) If so, would you expect to take the ratings into account in your internal career planning process?

YES	NO

4. ADEQUACY OF CURRENTLY AVAILABLE PROVISION FOR PROFESSIONAL DEVELOPMENT [Please tick the appropriate box]

4.1 How well, in general, does the range of available external courses meet your needs?

VERY WELL	WELL	ADEQUATELY	BADLY	VERY BADLY

Any comments?

4.2 How satisfactory, overall, are external courses?

TOO THEORETICAL	ABOUT RIGHT	TOO PRACTICAL

Any comments?

4.3 Is the location of courses important?

YES	NO

If so, please explain your requirement, e.g. 'within U.K.'; 'within day's journey'; etc.

4.4 What do you consider to be the maximum duration for a short external course?

1 DAY	2 - 3	3 - 5	MORE THAN 5

4.5 Do you believe that the competence of speakers at short courses is generally satisfactory?

YES	NO

4.6 Do you find that external short courses, in general, are organised to a satisfactory professional standard?

YES	NO

If not, please comment:-

5. CONSTRAINTS IN SATISFYING YOUR COMPANY'S PROFESSIONAL DEVELOPMENT NEEDS

Please indicate the relative importance of the following [1 high, 5 low].

5.1 Internal constraints

	1	2	3	4	5
(a) Difficulty of releasing key individuals					
(b) Cost considerations					
(c) Uncertainty in assessing the value of the Course to the Company					
(d) Difficulty in identifying suitable courses					

5.2 Constraints affecting individuals

(a) Unwillingness of managers to authorise participation					
(b) Reluctance of individuals to attend short courses					

5.3 Constraints associated with the providing agencies

(a) Inadequate communication of information concerning courses					
(b) Inadequate co-ordination of the programmes of different agencies					
(c) Inadequate course organisation					
(d) High course fees					

5.4 Any other comments concerning constraints?

6. WHO, IN YOUR COMPANY, DECIDES ON PARTICIPATION IN EXTERNAL SHORT COURSES [Please tick the appropriate box]

6.1 Decision of individual Engineer/Scientist	
6.2 As 6.1 above authorised by immediate superior	
6.3 As 6.1 above authorised by a Personnel/Training functional manager	
6.4 Corporate decision authorised by chief executive or other board member	

6.5 Other, please detail below:-

7. WHAT INVOLVEMENT IS YOUR COMPANY PREPARED TO HAVE IN PROVISION OF CONTINUING EDUCATION FOR PROFESSIONALS

7.1 In courses offered and their contents:

(a) would you like more direct involvement?

YES	NO

(b) if so, please tick if you would be prepared to help in one or more of the following ways:-

YES	NO

(i) propose topics, for inclusion in existing courses or for new courses

(ii) provide expert speakers from your Company's professional staff

7.2 In setting objectives and assessing courses, would you be willing to provide advice and comments?

YES	NO

7.3 In 'credit accumulation' and transfer would you be willing to support a system which attributed 'credits' to individuals for course attendance and required the Employer's co-operation?

YES	NO

8. PLEASE MAKE ANY OTHER COMMENTS BELOW:-

PLEASE POST THE COMPLETED QUESTIONNAIRE TO:-

Mr A.S. Brown
Harrogate Consultants
'South View'
Clint
HARROGATE
N.YORKS HG3 3DS

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Jack Mansell, Chief Officer, Further Education Unit

Objectives

The objects for which **The Further Education Unit (FEU)** is established are to promote, encourage and develop the efficient provision of further education in the United Kingdom and for that purpose:
a) to review and evaluate the range of existing further education curricula and programmes and to identify overlap, duplication, deficiencies and inconsistencies therein,
b) to determine priorities for action to improve the provision of further education and to make recommendations as to how such improvements can be effected,
c) to carry out studies in further education and to support investigations of and experimentation in, and the development of further education curricula and to contribute to and assist in the evaluation of initiatives in further education,
d) to disseminate and publish and to assist in the dissemination and publication of information about recommendations for and experiments and developments in further education.

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